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# Small Quantity Generator's Handbook for Managing RCRA (Resource Conservation and Recovery Act) Wastes Dry Cleaners and Commercial Laundries

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This RCRA Handbook was developed for businesses involved in dry cleaning and commercial laundering to provide assistance in complying with pertinent sections of the RCRA requirements. Section 2 summarizes dry cleaning operations and describes the characteristics of wastes generated and general waste management practices. Section 3 describes how these waste types may be subject to the RCRA and ARM regulations based on how they are managed and on their specific characteristics. Section 4 discusses the RCRA generator requirements, while Section 5 describes waste management strategies for minimizing the amount of hazardous waste generated by dry cleaners and launderies. Appendix A lists RCRA acute and toxic hazardous wastes (f,p, and u wastes). Appendix B provides a summary of RCRA Characteristic Wastes. Appendix C lists references and contacts for obtaining more information about hazardous wastes and their regulation.

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# THE SMALL QUANTITY GENERATOR'S HANDBOOK FOR MANAGING RCRA WASTES

## - DRY CLEANERS AND COMMERCIAL LAUNDRIES -

STATE OF MONTANA
DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
HELENA, MONTANA

JUNE, 1988

REPRODUCED BY
U.S. DEPARTMENT OF COMMERCE
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SPRINGFIELD, VA. 22161

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Prepared for:

State of Montana
Department of Health and Environmental Sciences
Helena, Montana

Prepared by:

Science Applications International Corporation
Bellevue, Washington

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# 1.0 INTRODUCTION

In 1976, Congress, recognizing that the problem of solid and hazardous waste disposal had become a national concern, passed the Resource Conservation and Recovery Act (RCRA). This legislation was designed to address two major problems:

- The dangers to human health and the environment posed by improper waste disposal
- The conservation of valuable material and energy resources

Subtitle C of RCRA establishes a "cradle-to-grave" hazardous waste management system, which is administered by the U.S. Environmental Protection Agency (EPA). This system provides for managing, tracking, and regulating hazardous wastes at each step of the way from generation to final disposal. The regulations developed by EPA apply to those who generate, transport, treat, store, or dispose hazardous wastes.

This RCRA Handbook was developed for businesses involved in dry cleaning and commercial laundering to provide assistance in complying with pertinent sections of the RCRA requirements. The manual also provides waste management strategies for minimizing waste quantities. Waste minimization has several economic advantages including reducing the costs required to comply with the RCRA requirements and reducing product requirements if waste recycling or reuse is practiced.

The information on the dry cleaning and laundering operations in this document was compiled through site visits to such businesses across the State of Montana. These site visits were conducted to identify the types and quantities of both hazardous and non-hazardous wastes typically generated, and to observe current waste management practices. Following these visits, a review of the RCRA regulations and the Administrative Rules of Montana (ARM) was performed to identify specific regulations applicable to dry cleaners.

Section 2.0 of this manual summarizes dry cleaning operations and describes the characteristics of wastes generated and general waste management

practices. Section 3.0 describes how these waste types may be subject to the RCRA and ARM regulations based on how they are managed and on their specific characteristics. Section 4.0 discusses the RCRA generator requirements, while Section 5.0 describes waste management strategies for minimizing the amount of hazardous waste generated by dry cleaners and laundries. Appendix A is a listing of RCRA acute and toxic hazardous wastes (F, P, and U wastes). Appendix B provides a summary of RCRA Characteristic Wastes. Finally, Appendix C contains a list of references and contacts for obtaining more information about hazardous wastes and their regulation.

## 2.0 DRY CLEANING OPERATIONS AND POTENTIAL WASTE TYPES

This section summarizes the typical operations of commercial and industrial laundries. Potential waste types that could be generated from these operations are also discussed.

### 2.1 SUMMARY OF OPERATIONS

Commercial and industrial laundries conduct both detergent-based washing and solvent-based cleaning operations. Detergent-based washing and bleaching operations do not typically generate hazardous wastes and are not discussed further in this handbook. Dry cleaning operations, using solvents, are used by both commercial and industrial laundries. Primary differences between commercial and industrial laundries are the quantities of cleaning done, the size of equipment, and the nature of the substances removed in the cleaning process. Industrial laundries clean a larger volume of materials, with the incoming garments or industrial linens having a higher content of petroleum based material (oil) and heavy metals. Industrial work clothes and shop rags are examples of the types of incoming laundry that would contain oils and metals.

Commercial laundries may use smaller equipment in their dry cleaning operations than industrial laundries. The difference in equipment size is due to the smaller volumes of laundry brought to the commercial cleaners by individual customers as compared to those supplied to the industrial laundries by businesses, either through a linen supply or similar service.

Commercial and industrial laundries use four general categories of cleaners in their operations: dry cleaning solvent, detergents, stain or spot removers, and bleach. Other materials that may be used include lubricating oils and softening agents. In general, the dry cleaning solvents represent the largest potential source of hazardous waste. Most dry cleaners now use perchloroethylene for dry cleaning. Other solvents that are used in the industry include Stoddard solvent (petroleum distillates) and fluorocarbons.

The quantities of solvents and detergents that a dry cleaning business uses depends on the volume of business and the efficiency of the equipment used.

Perchloroethylene solvent is available in 5-gallon to 55-gallon containers depending on the needs of the operation.

Generally, older established dry cleaning businesses have older equipment that may include a solvent recovery step or machines which have been retrofitted with solvent recovery equipment. New dry cleaning machines are available that are highly efficient in terms of heat, water, and solvent recovery. These machines tend to be closed-loop systems.

Many older systems are equipped with a solvent reclaiming dryer that actually combines clothes drying with solvent vapor collection. Solvent vaporizes off of the clothing during drying and is vented to a condenser for collection and reuse. These configurations may also use a deodorizing step that vents the solvent-laden air directly to the atmosphere, resulting in a potentially significant loss of solvent.

In order to minimize losses to the atmosphere, a variety of techniques are utilized. Carbon absorption units may be constructed as a component of the machine or vent system. Exhaust from various steps of the dry cleaning process is directed through the carbon bed for absorption. The clean air is usually vented to the outside, and the solvent-rich carbon is regenerated using a steam flush. The steam desorbs the solvent from the carbon and is subsequently condensed in a cooling unit. Solvent and water separate in the bottom of the condenser, and the clean solvent is collected for reuse. The water is reused or discharged to the sanitary sewer.

A second technique used to recover solvent is the recirculation of air within the system, using a refrigeration unit to strip the solvent. Solvent-rich air is cooled, so that the solvent condenses and collects as a liquid in the bottom of the refrigeration unit. Clean air is returned to the dry cleaning process to start the cycle again, and the solvent is also directed back to the cleaning process after going through a water separator. This type of recovery system minimizes venting to the atmosphere and recirculates cold air which helps to reduce wrinkling in the garments being cleaned.

Dry cleaning operations typically utilize filtering units to remove particulates from the solvents after cleaning. Dirt-laden solvent is passed through a filter unit containing either a paper-carbon cartridge or a filtering medium, such as diatomaceous earth. Cartridges must be replaced periodically, the frequency depending on the amount of use and the quantity of dirt removed from the solvent. Frequency of change-out for the cartridges ranges from three weeks to four months. Cartridges retain a significant amount of the solvent which can be recovered by draining and placing in a "cooker", where the spent cartridge is heated and the vaporized solvent is collected in a carbon absorption unit or a cooling unit as described above. A variety of methods are available for the cooking step. Cartridges can be placed directly in the dry cleaning wheel, lint trap, or solvent still. The cartridges can also be cooked within the filter housing. The heat source is either dry heat or live steam, depending on the process. Up to one gallon of solvent can be recovered from the cartridges with this type of process. Dry cleaning businesses may dispose of filter cartridges and filter media to municipal landfills or hazardous waste disposal facilities, depending on the number of cartridges produced and the types of solvents used.

Solvent stills may be used to recover the dry cleaning solvent and separate water and dirt. The sludge generated by these units can contain a large amount of the filter media (such as diatomaceous earth) along with dirt and a significant amount of solvent. Proper operation of a still can keep the solvent content of the sludge to a minimum. Businesses may generate from 15 to 2000 pounds per year of sludge from the bottoms of solvent stills.

Solvent recovery equipment used by dry cleaning business that use the Stoddard solvents or fluorocarbons rely on the same basic technologies presented above. Fluorocarbon-based dry cleaning equipment has generally been equipped with effective solvent recovery equipment for quite some time due to the cost of fluorocarbons. Some of the recovery systems that have been developed for the perchloroethylene based units were derived from the fluorocarbon systems.

## 2.2 WASTE CHARACTERISTICS

Solvents used by the dry cleaning industry can be classified into three groups. These are chlorinated hydrocarbons such as perchloroethylene, petroleum products such as Stoddard solvents, and fluorocarbons. All of these materials act as solvents to remove dirt, grease, oil, and stains, and to hold them in suspension until they can be filtered or separated in a still through vaporization of the solvent.

There are five waste types that could be generated from dry cleaning operations. These are (1) waste solvents, (2) filter cartridges from the solvent filter systems, (3) sludges from the solvent stills, (4) waste oils from machinery lubrication, and (5) containers with residual dry cleaning solvent. Each of these potential waste types is described in more detail below.

1. Waste Solvents - Waste solvents are generated from businesses that do not have recycling equipment and from operations where solvent eventually needs change-out following repeated recovery in a still.

2. Filter Cartridges - Spent filter cartridges which have been used to filter dirt, oil, and grease from dry cleaning solvent. They generally contain paper and carbon, or diatomaceous earth as the filter medium which is fixed in a cartridge. Residual solvent is retained in the cartridge, as well as dirt, oil, and grease.

3. Sludges - Solvent stills are used to recycle clean, recoverable solvent and separate dirt, oil, and grease. Sludges which collect in the bottom of the still contain dirt, oil and grease, and solvent.

4. Waste Oils - Small amounts of waste oils are generated for the lubrication of dry cleaning machinery.

5. Containers - These materials include the empty product containers or drums in which the dry cleaning business receives solvent feedstock. These may contain residual material after the solvent has been drained for use.

Depending on whether these materials contain listed hazardous wastes or display hazardous characteristics, and on how they are handled, they may be subject to Federal and State hazardous waste regulations. Section 3.0 describes how these potential waste types could be subject to regulation and provides a guide to determine if particular wastes are subject to these regulations.

# 3.0 HAZARDOUS WASTE REGULATIONS

## 3.1 FEDERAL HAZARDOUS WASTE REGULATIONS

The Federal regulations governing the management of hazardous wastes are specified under the Resource Conservation and Recovery Act (RCRA). The objectives of RCRA are to improve the management of wastes to protect the environment and human health, and to conserve valuable materials and energy resources. The RCRA regulations are specified in the Code of Federal Regulations (CFR), Title 40, Parts 260 through 272. The Environmental Protection Agency has the authority to administer the RCRA program.

## 3.2 STATE HAZARDOUS WASTE REGULATIONS

In the State of Montana, the Department of Health and Environmental Science (DHES) has been given the authority from EPA to develop and administer a hazardous waste management program. EPA requires that the development and administration of the state program is consistent with the federal standards set forth in the RCRA regulations. The State has developed hazardous waste management regulations under the Montana Hazardous Waste Act of October 1, 1985, which are specified in the Administrative Rules of Montana, Title 16, Chapter 44. This state program incorporates the Federal RCRA standards and includes additional requirements that were developed for the classification, generation, storage, treatment and disposal of hazardous wastes.

## 3.3 HAZARDOUS WASTE CLASSIFICATION

RCRA and the Administrative Rules of Montana (ARM) have established certain standards and criteria based on waste characteristics and management practices to determine whether a waste is considered hazardous. If a waste is determined to be hazardous, specific regulations under RCRA and ARM apply to the management of that waste including storage, treatment and disposal of the waste.

There are two ways a waste may be brought into the hazardous waste regulatory system: listing and identification through characteristics. These classifications are summarized below:

- Listed Wastes - A waste may be considered hazardous if it appears on any one of four lists of hazardous wastes contained in the RCRA regulations. These wastes have been listed because they exhibit one of the characteristics described below or contain toxic constituents that have been shown to be harmful to human health and the environment. The RCRA regulations list over 400 hazardous wastes, including wastes derived from non-specific sources (F Wastes), manufacturing processes (K Wastes), and discarded chemical products (P and U Wastes). These lists can be found in 40 CFR 261, Subpart D. The F, P, and U wastes are listed in Appendix A of this manual.

- Characteristic Wastes - Even though a waste does not appear on one of the above hazardous waste lists, it may be considered a hazardous waste if it exhibits certain characteristics. A waste may be considered hazardous if it is ignitable, corrosive, reactive or EP toxic. These specific characteristics and criteria for identifying the RCRA characteristic wastes are described in detail in Appendix B. These characteristics are referenced in 40 CFR 261, Subpart C.

## 3.4 APPLICABILITY OF FEDERAL AND STATE REGULATIONS TO DRY CLEANING OPERATIONS

Wastes generated from dry cleaning may be subject to the RCRA and ARM regulations, depending on how they are managed and their specific characteristics. The determination of applicable hazardous waste regulations to dry cleaners involves determining types of wastes generated, whether they are classified as hazardous wastes, and how each waste type is managed. Section 2.0 of this manual provided a summary of the types of wastes generated from dry cleaning and how these wastes are typically managed. Waste management practices include on-site recycling; off-site disposal of filters, solvents, and containers; and sanitary sewer discharge for wastewater. In general, RCRA and ARM regulations apply to those management options that involve on-site treatment and disposal, and off-site disposal of hazardous wastes. Sanitary sewer discharges are generally not subject to RCRA and ARM hazardous waste regulations, but may be subject to local or state wastewater discharge limits.

### 3.4.1 Waste Solvents and Sludges

Spent materials containing perchloroethylene, or Valclene (trichlorotrifluoroethane) or other chlorinated fluorocarbons are listed wastes, designated as F002 waste if they are intended to be discarded. No method has been identified that removes all residual solvent from sludges. Some solvents are not RCRA-listed wastes, but the sludges or spent filter media

exhibit the characteristic of ignitability (D001). These substances are hazardous wastes if they are discarded. An example of a RCRA characteristic solvent this is ignitable (D001) is Stoddard solvent.

### 3.4.2 Filter Cartridges

Filter cartridges are hazardous wastes if there is any residue of a RCRA-listed solvent, such as perchloroethylene, remaining in the cartridges and they are intended to be discarded. These spent materials containing perchloroethylene, or Valclene (trichlorotrifluoroethane) or other chlorinated fluorocarbons are F002 wastes. No method has been identified that removes all residual solvents from filter cartridges. If the solvent used exhibits to characteristic of ignitability (D001), these spent cartridges containing the ignitable solvent are hazardous wastes if they are being discarded. An example of an ignitable solvent is Stoddard solvent.

### 3.4.3 Containers

Containers intended for discard which are not empty of perchloroethylene are EPA Hazardous Waste Code U210. Containers which are not empty of Stoddard solvent may meet the ignitable characteristic, and be considered D001 waste. Containers which contained new solvent are not hazardous wastes in the following circumstances:

- Containers that are being reused or recycled. This includes containers that are returned to the vendor or distributor to be reused.
- Containers that are being discarded and are considered empty as defined in RCRA and ARM regulations. The definition of empty is explained below.

  An empty container is defined as follows:

  - All wastes have been removed that can practically be removed by methods of pouring, pumping, or aspirating, and
  - No more than 2.5 centimeters (1 inch) of residue remains on the bottom of the container, or
  - For containers less than or equal to 110 gallons in size: No more than 3 percent by weight of the total capacity of the container remains in the container. For containers greater than 110 gallons in size: No more than 0.3 percent by weight of the total capacity of the container remains in the container.

### 3.4.4 Waste Oils

Waste oils and greases result from the lubrication of dry cleaning equipment. Waste oils from the lubrication of dry cleaning equipment are considered exempt from regulation under RCRA and ARM as long as they are not mixed with any materials that are considered hazardous wastes.

In summary, these waste types are considered hazardous wastes under the RCRA and ARM regulations: filter cartridges that are being discarded, waste solvents and sludges that are being discarded, and empty containers that are being discarded without being properly emptied. These hazardous wastes are subject to specific regulations governing the generation, storage, treatment, and disposal of the wastes. The specific regulations that apply to the management of these hazardous wastes are described in Section 4.0 of this manual.

# 4.0 HAZARDOUS WASTE GENERATOR REQUIREMENTS

## 4.1 BACKGROUND

The Environmental Protection Agency (EPA) and the Montana Department of Health and Environmental Science (DHES) classify generators of hazardous waste in three categories according to the amount of waste they generate. This classification was done in response to public attention to the fact the inappropriate management of even small quantities of hazardous waste can result in health or environmental problems. Depending on which generator category applies to a specific business, certain precautions or actions may be required in the management of hazardous wastes.

## 4.2 CATEGORIES OF GENERATORS

Businesses that generate 1,000 kilograms or more (2,200 pounds) per month of hazardous waste (or one kilogram per month of acute hazardous waste) must abide by all of the requirements of the law, and are not eligible for any exemptions. These are classified as large hazardous waste generators. Requirements for this category are not addressed in this manual.

Businesses generating between 100 kilograms and 1,000 kilograms (220 pounds to 2,200 pounds) per month of hazardous waste have been designated as SMALL GENERATORS and are allowed some special provisions. Finally, businesses that generate less than 100 kilograms (220 pounds) per month of hazardous waste are designated as CONDITIONALLY EXEMPT GENERATORS.

## 4.3 REQUIREMENTS FOR ALL GENERATORS

Each of the requirements that are described below apply to all generators, regardless of quantity. These are summaries of the Federal regulations and the State of Montana's regulations. The Federal regulations for hazardous waste generators are found in the Code of Federal Regulations, Title 40, Parts 261 and 262 (40 CFR 261 and 262) and are administered by EPA. The State of Montana's rules for hazardous waste generators are found in the Administrative Rules of Montana, Title 16, Chapter 44, and administered by DHES.

It is important to note that the Federal laws apply nationwide. In some cases, requirements that have been added to the original Federal laws have not yet been adopted by the State of Montana. Even if the State has not yet adopted certain requirements from the Federal law, businesses are still required to abide by these Federal requirements. In addition, the State of Montana may have developed special requirements to address special problems within the state.

- All generators must determine which of the wastes they generate are hazardous. Sections 2.0 and 3.0 of this guidance manual contains descriptions of the hazardous wastes generated in a specific type of business. [40 CFR 262.11, ARM 16.44.402]

- All generators must segregate <u>listed</u> (F, K, P and U) hazardous wastes from non-hazardous wastes. Listed hazardous wastes are materials that have been specifically catalogued and are always considered hazardous. MIXING THESE WASTES WITH NON-HAZARDOUS WASTE WILL MAKE THE ENTIRE VOLUME A HAZARDOUS WASTE. Sections 2.0 and 3.0 of this guidance manual identified listed hazardous wastes that may be generated in your business. Some types of solvent wastes (i.e., perchloroethylene) are expected to be listed wastes.

- Under certain circumstances, generators may mix characteristic hazardous wastes and non-hazardous wastes if they are compatible (not reactive or explosive, etc.). The mixture is considered non-hazardous only if it no longer meets the characteristics of a hazardous waste. IF THE MIXTURE IS A WASTE EXHIBITING A HAZARDOUS CHARACTERISTIC, THE ENTIRE MIXTURE BECOMES A HAZARDOUS WASTE, AND THE SMALL GENERATOR MAY BECOME A LARGE GENERATOR AS A RESULT. Section 3.0 and Appendix B of this guidance manual identify the characteristics of hazardous waste that may apply to your business.

- In the event of a hazardous waste spill, all generators must treat spilled hazardous wastes, clean-up residues, and containers as hazardous wastes.

- All generators must use containers that are compatible with the hazardous waste they are to contain. Containers should be sealed and free from leakage.

- All generators of hazardous waste must ensure their wastes are delivered to an off-site facility that is authorized by EPA or the state in which the receiving facility is located to receive municipal, industrial, or hazardous waste. The type of facility depends on the category of the generator.

- All generators must ensure that off-site shipments of hazardous waste are labeled, marked, and placarded according the U.S. Department of Transportation (DOT) requirements. This includes a U.S. DOT waste description, shipping name, hazard class, and

identification number. Any questions about DOT shipping requirements can be referred to the Montana State Department of Transportation. [40 CFR 262.30 to 262.33]

- A Hazardous Waste Manifest is required when shipping hazardous wastes off-site. The standard form is the U.S. EPA manifest form 8700-22, which is processed by DHES. [ARM 16.44.405]

## 4.4 REQUIREMENTS FOR CONDITIONALLY EXEMPT GENERATORS

A business qualifies as a Conditionally Exempt Generator if no more than 100 kilograms (220 pounds) per month of hazardous waste and no more than 1 kilogram (2.2 pounds) per month of acutely hazardous waste are generated. Acute hazardous wastes are listed in Table A-1 of Appendix A. Dry cleaning wastes are not expected to be acute hazardous wastes. No more than 1,000 kilograms (2,200 pounds) of hazardous waste can be accumulated on-site or on your property. There is no time limit for this accumulation, as long as the 1,000 kilogram storage limit is not exceeded.

As a rule of thumb, a 55-gallon drum of hazardous waste is about 200 kilograms (440 pounds). This means that the business must generate less than one-half of a 55-gallon drum of hazardous waste per month or accumulate no more than five 55-gallon drums at any one time.

As long as the above two conditions are maintained, a business falls into a category called "conditionally exempt". The business must still meet all of the requirements presented in Section 4.3 of this manual, but it is conditionally exempt from other requirements for generators of hazardous wastes.

Examples of how a business can lose conditionally exempt status are:

- The business generates less than 100 kilograms per month eleven months out of the year, and more than 100 kilograms in the twelfth month.
- The amount of hazardous waste accumulated by a business exceeds 1,000 kilograms.

If hazardous waste management practices result in a business losing its conditionally exempt status, all requirements for Small Generators must be met. These are listed in Section 4.5 of this manual.

As long as the business meets the requirements of this section, hazardous waste may be disposed at a hazardous waste facility, or a licensed Class II sanitary landfill or other facility approved by the State of Montana for industrial or municipal wastes on the condition that the operating authority of the landfill accepts the waste.

## 4.5 REQUIREMENTS FOR SMALL GENERATORS

Small generators are businesses generating between 100 and 1,000 kilograms (220 to 2,200 pounds) of hazardous waste per month. If a business falls in this category, it also may not generate more than 1 kilogram (2.2 pounds) per month of acute hazardous waste (see Appendix A, Table A-1), and may not accumulate on-site more than 6,000 kilograms of hazardous waste. Businesses in this category must meet the following requirements:

### Identification

- Small generators must have an EPA identification number. This twelve-digit number is part of a national data base to track hazardous waste activities for generators, transporters, disposal facilities, etc. In order to obtain an EPA identification number, contact the State of Montana Department of Health and Environmental Sciences and request a copy of EPA form 8700-12 "Notification of Hazardous Waste Activity". [40 CFR 262.12, ARM 16.44.403]

### Accumulation Time Limit

- Storage of hazardous waste on the generator's property must not exceed 180 days, except if the waste must be transported greater than 200 miles, in which case the waste may be stored for up to 270 days. Hazardous waste may only be transported to authorized treatment, storage, or disposal facilities (TSDF). DHES can assist businesses with locating an authorized facility. This provision is designed to allow Small Generators to accumulate enough waste to justify making a shipment. [40 CFR 262.34 (e-f), ARM 16.44.415]

- Containers or drums must be labeled and dated on the first day that any hazardous waste is placed in them. From this date, each individual container may hold waste for a maximum of 180 days (or 270 days, depending on shipping distance) before it must be shipped to a TSDF. Wastes may not be transferred from one container to another to extend the allowable accumulation time. [40 CFR 262.34, ARM 16.44.415]

- Small Generators who reach the 6,000 kilogram (13,200 pounds) accumulation limit for total hazardous wastes on site must ship the waste to a TSDF in accordance with the rules in this section.

On-site Treatment

- Under certain circumstances, Small Generators may treat hazardous wastes on their property without a special permit only if the treatment takes place within the 180 day (or 270 day) time limit for storage and only if all container and tank storage requirements presented below are followed, and all necessary precautions taken to prevent spills or accidents. On-site treatment should be discussed with Montana DHES prior to commencement of operations to ensure that all applicable regulations have been followed.

On-site Disposal

- No Small Generator may dispose of hazardous wastes on their property without a **Disposal Permit** issued by EPA or DHES.

Shipment

- Small Generators must ship wastes to a hazardous waste TSDF. Wastes must be shipped using a manifest, and all manifest and waste analysis records must be maintained for at least three years. Care should be taken in selecting a waste hauler and a TSDF since the generator is **still responsible** for the proper management of the waste, even after it leaves his property. The generator should ensure that all hazardous waste haulers and TSDFs have EPA ID numbers. [40 CFR 262.40, 262.44, ARM 16.44.416]

Container Storage

If hazardous wastes are stored in containers (such as drums) the generator must:

- Clearly label each container with the words "Hazardous Waste" and the date on which waste storage begins in that container. Labels can be obtained from DHES.

- Make sure that hazardous waste is not stored in a container that will be corroded, ruptured, or damaged in any way by that waste. [40 CFR 265.172]

- Containers should be closed except when being filled or emptied. [40 CFR 265.173]

- Inspect containers weekly. Keep containers in good shape and replace any that are leaking. [40 CFR 265.174]

- Transfer hazardous waste from leaking containers to different containers. Label the new containers with the start date from the original container. [40 CFR 265.171]

- Never store wastes in the same container if they are non-compatible (reactive, explosive, etc.). [40 CFR 265.177]

- Containers of ignitable or reactive wastes must be stored as far as possible from the facility property line to ensure a buffer zone.

Tank Storage

If hazardous wastes are stored in tanks the generator must: [40 CFR 265.201]

- Inspect tanks weekly and ensure that they are not leaking. Inspect monitoring or gauging systems each operating day.

- Make sure that hazardous waste is not stored in a tank that will be corroded, ruptured, or damaged in any way by that waste.

- Keep the tank covered or maintain at least two feet of freeboard (space at the top of the tank) in uncovered tanks.

- Provide a means to cut off or divert flow of waste into the tank in the event of a problem.

- Abide by National Fire Protection Association requirements for tanks containing ignitable or reactive wastes. These requirements specify the distances needed to establish safe buffer zones for various liquids based on combustible and flammable characteristics. The local fire department or DHES can assist with this.

Emergency Response

- At least one employee must be on hand or on call at all times in case of an emergency, and to be responsible for coordinating emergency response measures. This person is the emergency coordinator and he or his designee must respond to any emergencies.

- Small Generators must post the following information next to the telephone:

  - Name and telephone number of the emergency coordinator

  - Location of the fire extinguishers, spill control equipment, and fire alarm

  - Telephone number of the fire department, unless the facility is equipped with a direct alarm

- Small Generators must ensure that all employees are thoroughly familiar with the waste handling and emergency procedures relevant to their responsibilities.

- Emergencies that require a response include the following:

  - In the event of a fire, call the fire department or attempt extinguish the fire using a fire extinguisher

  - In the event of a spill, contain the flow of hazardous waste to the extent possible, and as soon as is practicable, clean up the hazardous waste and any contaminated materials or soil

- In the event of a fire, explosion, or other release that could threaten human health outside the facility or when the generator has knowledge that a spill has reached surface waters, the generator must immediately notify both the Montana DHES Hazardous Materials Spills Program (1-406-444-6911) and the National Response Center (1-800-424-8802). The report must include the following:

  - The generator's name, address, and EPA identification number

  - Date, time, and type of accident (e.g., spill, fire)

  - Quantity and type of hazardous waste involved in the incident

  - Extent of injuries, if any

  - Estimated quantity and disposition of recovered materials, if any

## 5.0 WASTE MANAGEMENT PLANS

This section of the manual provides waste management strategies currently available to those businesses involved in dry cleaning. Waste management strategies are focused on minimizing the amount of hazardous wastes that could be generated from these operations. These are several advantages of hazardous waste minimization including:

- Reducing the high costs associated with the management and disposal of hazardous wastes
- Reducing the liability risks associated with the management and disposal of hazardous wastes
- Reducing the problems arising from restrictions on land disposal of certain hazardous wastes
- Minimizing the time and resource required to comply with the hazardous waste management regulations

Waste minimization practices can include product substitution, process modifications, waste treatment, good housekeeping practices, and recycling and re-use. The selection of a particular waste minimization practice is based upon the industry or business operations, types of wastes generated, and their individual needs and problems.

For the dry cleaning industry, waste minimization techniques have been practiced for the past several years in the form of solvent recovery and reuse. Dry cleaning solvent is recovered from garments, from vented air, and from the filtration systems by methods described in Section 2.0 of this handbook. The solvent is typically recycled as long as it is usable. The practice of reusing the solvent helps to reduce the amount of feedstock solvent that is required, which reduces product costs resulting in an economic benefit.

The following sections describe waste minimization practices for dry cleaning operations. The practices described have been based upon methods currently used by the majority of dry cleaning operations and are consistent with current RCRA and ARM regulations. The discussion provides guidance for those unfamiliar with the current practices of reusing solvents.

Some general guidelines for the maintenance of dry cleaning equipment include the routine inspection and replacement of gaskets on dryer doors and periodic inspection and replacement of seals on dryer and deodorizer valves. These measures will help to minimize solvent loss. Minimizing solvent retention in garments when unloading and closing solvent containers when not in use will also minimize solvent loss. Finally, inspection and repair of air ducts and exhaust vents will help to minimize the release of solvent to the atmosphere.

## 5.1 SPENT FILTER CARTRIDGES

Waste management options for spent solvent filter cartridges include:

- Extended Use - Filter cartridges should be used as long as possible without interfering with the dry cleaning process. Increasing the duration of use of each cartridge will reduce the total number of cartridges used, therefore the total number of cartridges disposed. It may also be possible to extend cartridge life by modifying operational practices (prewashing, etc.).

- Thorough Solvent Recovery - Every effort should be taken to remove as much solvent as possible from filter cartridges. Gravity drainage of the filter and "cooking" are two regularly used techniques. Solvent is first allowed to drain by gravity, then the cartridge is heated to recover as much of the solvent as possible using a vapor recovery system. This is most easily accomplished by placing the cartridge in the dry cleaning wheel, the lint trap, or the solvent still. Equipment can be acquired that will allow cleaning of cartridges while still in the housing using either dry heat or live steam. Recovered solvent can then be reused.

- Disposal - When there is no longer any use for the filter cartridge, it must be disposed. In this case, the cartridge may be a hazardous waste depending on the solvent used and must be managed according to appropriate hazardous waste management practices outlined in Sections 3.0 and 4.0 of this manual. To minimize the amount of hazardous waste that must be disposed, cartridges should not be mixed with other wastes, such as paper and other non-hazardous solid wastes.

## 5.2 SPENT SOLVENTS AND SLUDGES FROM SOLVENT STILLS

Waste management options for spent solvents and sludges include:

- Extended Use - The life of the solvents used on process may be extended by modifying operational practices, such as prewashing material to remove some particulates and oils.

- Maximize Solvent Recovery - A large portion of the sludge removed as a still bottom contains recoverable solvent. Additional solvent may be removed from the sludge by mechanical means, such as a filter press or similar equipment or by using heat or steam.

- Disposal - When there is no longer any use for the spent solvent and sludges, they must be disposed. Sludges and spent solvents may be hazardous waste and must be managed according to appropriate hazardous waste management practices outlined in Sections 3.0 and 4.0 of this manual. To minimize the amount of hazardous waste that must be disposed, these solvents and sludges should not be mixed with non-hazardous wastes such as used oils.

## 5.3 WASTE OILS

Waste oils from the lubrication of dry cleaning equipment are considered exempt from regulation under RCRA and ARM as long as they are not mixed with any materials that are considered hazardous wastes. If waste oils are mixed with other materials that are regulated as hazardous wastes under RCRA and ARM, the entire mixture becomes a hazardous waste and must be managed in accordance with RCRA and ARM regulations.

Because the waste lubricating oils generated by the dry cleaning industry are in small amounts, the most viable option for waste minimization may be off-site recycling. Used oil services will pick up oil for a small charge. The service should be a registered used oil marketing business and the generator should determine from the service what the final disposition of the oil will be. Services utilizing oils in an environmentally unsafe manner should not be used!

## 5.4 EMPTY CONTAINERS

Waste management options for empty containers include recycling, reuse, or disposal. The definition of an empty container is explained in Section 3.4.3 of this manual. Waste management options for empty containers are discussed below:

- Recycling - Containers may be returned to the vendor or distributor so that they can be reused. Depending upon the type of solvent previously stored in the container, the vendor may require that the container be rinsed by the user prior to return. Containers recycled in this manner are not considered hazardous wastes and therefore are not subject to regulation.

- Reuse - Containers may be reused if they have been adequately rinsed to remove the residues of the material that was originally inside. If a container is used to store sludges or spent solvent, the original contents of the container must be the same or compatible with the solvent, and the container must meet the requirements for integrity of a hazardous waste container. The integrity requirements are explained in Section 4.5 of this manual.

- Disposal - If a solvent container has been adequately rinsed, it may be disposed at a licensed Class II sanitary landfill. In some cases, the landfill authority may require that the containers be punctured or crushed prior to acceptance. Some cities or counties may have restrictions on the type, size, or number of containers that can be accepted at the landfill.

Table A-1

LIST OF ACUTE HAZARDOUS WASTES
Source: 40 CFR 261.33(e)

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| P023 | 107-20-0 | Acetaldehyde, chloro- |
| P002 | 591-08-2 | Acetamide, N-(aminothioxomethyl)- |
| P057 | 640-19-7 | Acetamide, 2-fluoro- |
| P058 | 62-74-8 | Acetic acid, fluoro-, sodium salt |
| P066 | 16752-77-5 | Acetimidic acid, N-[(methylcarbamoyl)oxy] thio-, methyl ester |
| P002 | 591-08-2 | 1-Acetyl-2-thiourea |
| P009 | 131-74-8 | Ammonium picrate (R) |
| P119 | 7803-55-6 | Ammonium vanadate |
| P010 | 7778-39-4 | Arsenic acid |
| P012 | 1327-53-3 | Arsenic oxide $As_2$ |
| P011 | 1303-28-2 | Arsenic oxide $As_2O_5$ |
| P011 | 1303-28-2 | Arsenic pentoxide |
| P012 | 1327-53-3 | Arsenic trioxide |
| P038 | 692-42-2 | Arsine, diethyl- |
| P036 | 696-28-6 | Arsonous dichloride, phenyl- |
| P054 | 151-56-4 | Aziridine |
| P013 | 542-62-1 | Barium cyanide |
| P024 | 106-47-8 | Benzenamine, 4-chloro- |
| P077 | 100-01-6 | Benzenamine, 4-nitro- |
| P028 | 100-44-7 | Benzene, (chloromethyl)- |
| P042 | 51-43-4 | 1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]-, (R) |
| P046 | 122-09-8 | Benzeneethanamine, alpha,alpha-dimethyl- |
| P014 | 108-98-5 | Benzenethiol |
| P001 | [1]81-81-2 | 2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, and salts |
| P028 | 100-44-7 | Benzyl chloride |
| P015 | 7440-41-7 | Beryllium dust |
| P016 | 542-88-1 | Bis(chloromethyl) ether |
| P017 | 598-31-2 | Bromoacetone |
| P018 | 357-57-3 | Brucine |
| P021 | 592-01-8 | Calcium cyanide |
| P022 | 75-15-0 | Carbon bisulfide |
| P022 | 75-15-0 | Carbon disulfide |
| P095 | 75-44-5 | Carbonic dichloride |
| P023 | 107-20-0 | Chloroacetaldehyde |
| P024 | 106-47-8 | p-Chloroaniline |
| P029 | 544-92-3 | Copper cyanide |
| P030 | —— | Cyanides (soluble cyanide salts), not otherwise specified |
| P031 | 460-19-5 | Cyanogen |
| P033 | 506-77-4 | Cyanogen chloride |
| P034 | 131-89-5 | 2-Cyclohexyl-4,6-dinitrophenol |
| P036 | 696-28-6 | Dichlorophenylarsine |
| P037 | 60-57-1 | Dieldrin |
| P038 | 692-42-2 | Diethylarsine |
| P041 | 311-45-5 | Diethyl-p-nitrophenyl phosphate |
| P040 | 297-97-2 | O,O-Diethyl O-pyrazinyl phosphorothioate |
| P043 | 55-91-4 | Diisopropyl fluorophosphate (DEP) |
| P004 | 309-00-2 | 1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5alpha, 8alpha,8abeta)- |
| P003 | 107-02-8 | Acrolein |
| P070 | 116-06-3 | Aldicarb |
| P004 | 309-00-2 | Aldrin |
| P005 | 107-18-6 | Allyl alcohol |
| P006 | 20859-73-8 | Aluminum phosphide (R,T) |
| P007 | 2763-96-4 | 5-(Aminomethyl)-3-isoxazolol |
| P008 | 504-24-5 | 4-alpha-Aminopyridine |
| P046 | 122-09-8 | alpha, alpha-Dimethylphenethylamine |
| P047 | [1]534-52-1 | 4,6-Dinitro-o-cresol and salts |
| P048 | 51-28-5 | 2,4-Dinitrophenol |
| P020 | 88-85-7 | Dinoseb |
| P085 | 152-16-9 | Diphosphoramide, octamethyl- |
| P039 | 298-04-4 | Disulfoton |
| P049 | 541-53-7 | 2,4-Dithiobiuret |
| P050 | 115-29-7 | Endosulfan |
| P088 | 145-73-3 | Endothal |
| P051 | 72-20-8 | Endrin |
| P042 | 51-43-4 | Epinephrine |
| P101 | 107-12-0 | Ethyl cyanide |
| P054 | 151-56-4 | Ethyleneimine |
| P097 | 52-85-7 | Famphur |
| P056 | 7782-41-4 | Fluorine |
| P057 | 640-19-7 | Fluoroacetamide |
| P058 | 62-74-8 | Fluoroacetic acid, sodium salt |
| P065 | 628-86-4 | Fulminic acid, mercury(2+)salt (R,T) |
| P059 | 76-44-8 | Heptachlor |
| P062 | 757-58-4 | Hexaethyltetraphosphate |
| P116 | 79-19-6 | Hydrazinecarbothioamide |
| P068 | 60-34-4 | Hydrazine, methyl- |
| P063 | 74-90-8 | Hydrocyanic acid |
| P063 | 74-90-8 | Hydrogen cyanide |
| P096 | 7803-51-2 | Hydrogen phosphide |
| P064 | 624-83-9 | Isocyanic acid, methyl ester |
| P060 | 465-73-6 | Isodrin |
| P007 | 2763-96-4 | 3(2H)-Isoxazolone, 5-(aminomethyl)- |
| P092 | 62-38-4 | Mercury, (acetato-O)phenyl- |
| P065 | 628-86-4 | Mercury fulminate (R,T) |
| P082 | 62-75-9 | Methanamine, N-methyl-N-nitroso- |
| P016 | 542-88-1 | Methane, oxybis(chloro- |
| P112 | 509-14-8 | Methane, tetranitro- (R) |
| P118 | 75-70-7 | Methanethiol, trichloro- |
| P050 | 115-29-7 | 6,9-Methano-2,4,3-benzodioxathiepen, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide |
| P059 | 76-44-8 | 4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro- |
| P066 | 16752-77-5 | Methomyl |
| P067 | 75-55-8 | 2-Methylaziridine |
| P068 | 60-34-4 | Methyl hydrazine |
| P064 | 624-83-9 | Methyl isocyanate |
| P069 | 75-86-5 | 2-Methyllactonitrile |
| P071 | 298-00-0 | Methyl parathion |
| P072 | 86-88-4 | alpha-Naphthylthiourea |

Table A-1 (cont'd)

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| P060 | 465-73-6 | 1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5beta,8beta,8abeta)- |
| P037 | 60-57-1 | 2,7:3,6-Dimethanonaphth[2,3b]oxirane, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2aalpha,3beta,6beta,6aalpha,7beta,7aalpha)- |
| P051 | 72-20-8 | 2,7:3,6-Dimethanonaphth[2,3b]oxirane, octahydro-, (1aalpha,2beta,2abeta,3alpha,6alpha,6abeta,7beta,7aalpha)- |
| P044 | 60-51-5 | Dimethoate |
| P045 | 39196-18-4 | 3,3-Dimethyl-1-(methylthio)-2-butanone, O-[(methylamino)carbonyl] oxime |
| P085 | 152-16-9 | Octamethylpyrophosphoramide |
| P087 | 20816-12-0 | Osmium oxide |
| P087 | 20816-12-0 | Osmium tetroxide |
| P088 | 145-73-3 | 7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid |
| P089 | 56-38-2 | Parathion |
| P034 | 131-89-5 | Phenol, 2-cyclohexyl-4,6-dinitro- |
| P048 | 51-28-5 | Phenol, 2,4-dinitro- |
| P047 | [1]534-52-1 | Phenol, 2-methyl-4,6-dinitro- and salts |
| P020 | 88-85-7 | Phenol, 2-(1-methylpropyl)-4,6-dinitro- |
| P009 | 131-74-8 | Phenol, 2,4,6-trinitro-, ammonium salt (R) |
| P092 | 62-38-4 | Phenylmercury acetate |
| P093 | 103-85-5 | Phenylthiourea |
| P094 | 298-02-2 | Phorate |
| P095 | 75-44-5 | Phosgene |
| P096 | 7803-51-2 | Phosphine |
| P041 | 311-45-5 | Phosphoric acid, diethyl 4-nitrophenyl ester |
| P039 | 298-04-4 | Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester |
| P094 | 298-02-2 | Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl] ester |
| P044 | 60-51-5 | Phosphorodithioic acid, O,O-dimethyl S[2-(methylamino)-2-oxoethyl] ester |
| P043 | 55-91-4 | Phosphorofluoridic acid, bis(1-methylethyl) ester |
| P089 | 56-38-2 | Phosphorothioic acid, O,O-diethyl O-(p-nitrophenyl) ester |
| P040 | 297-97-2 | Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester |
| P097 | 52-85-7 | Phosphorothioic acid, O-[4-((dimethylamino)-sulfonyl)phenyl] O,O-dimethyl ester |
| P071 | 298-00-0 | Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester |
| P110 | 78-00-2 | Plumbane, tetraethyl- |
| P098 | 151-50-8 | Potassium cyanide |
| P099 | 506-61-6 | Potassium silver cyanide |
| P070 | 116-06-3 | Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime |
| P101 | 107-12-0 | Propanenitrile |
| P027 | 542-76-7 | Propanenitrile, 3-chloro- |
| P069 | 75-86-5 | Propanenitrile, 2-hydroxy-2-methyl- |
| P081 | 55-63-0 | 1,2,3-Propanetriol, trinitrate (R) |
| P017 | 598-31-2 | 2-Propanone, 1-bromo- |
| P102 | 107-19-7 | Propargyl alcohol |
| P003 | 107-02-8 | 2-Propenal |
| P073 | 13463-39-3 | Nickel carbonyl |
| P073 | 13463-39-3 | Nickel carbonyl, (T-4)- |
| P075 | [1]54-11-5 | Nicotine and salts |
| P076 | 10102-43-9 | Nitric oxide |
| P077 | 100-01-6 | p-Nitroaniline |
| P078 | 10102-44-0 | Nitrogen dioxide |
| P076 | 10102-43-9 | Nitrogen oxide NO |
| P078 | 10102-44-0 | Nitrogen oxide $NO_2$ |
| P081 | 55-63-0 | Nitroglycerine (R) |
| P082 | 62-75-9 | N-Nitrosodimethylamine |
| P084 | 4549-40-0 | N-Nitrosomethylvinylamine |
| P074 | 557-19-7 | Nickel cyanide |
| P005 | 107-18-6 | 2-Propen-1-ol |
| P067 | 75-55-8 | 1,2-Propylenimine |
| P102 | 591-08-2 | 2-Propyn-1-ol |
| P008 | 504-24-5 | Pyridinamine |
| P075 | [1]54-11-5 | Pyridine, (S)-3-(1-methyl-2-pyrrolidinyl)-, and salts |
| P111 | 107-49-3 | Pyrophosphoric acid, tetraethyl ester |
| P103 | 630-10-4 | Selenourea |
| P104 | 506-64-9 | Silver cyanide |
| P105 | 26628-22-8 | Sodium azide |
| P106 | 143-33-9 | Sodium cyanide |
| P107 | 1314-96-1 | Strontium sulfide |
| P108 | [1]57-24-9 | Strychnidin-10-one, and salts |
| P018 | 357-57-3 | Strychnidin-10-one, 2,3-dimethoxy- |
| P108 | [1]57-24-9 | Strychnine and salts |
| P115 | 10031-59-1 | Sulfuric acid, thallium(I) salt |
| P109 | 3689-24-5 | Tetraethyldithiopyrophosphate |
| P110 | 78-00-2 | Tetraethyl lead |
| P111 | 107-49-3 | Tetraethylpyrophosphate |
| P112 | 509-14-8 | Tetranitromethane (R) |
| P062 | 757-58-4 | Tetraphosphoric acid, hexaethyl ester |
| P113 | 1314-32-5 | Thallic oxide |
| P113 | 1314-32-5 | Thallium(III) oxide |
| P114 | 12039-52-0 | Thallium(I) selenide |
| P115 | 10031-59-1 | Thallium(I) sulfate |
| P109 | 3689-24-5 | Thiodiphosphoric acid, tetraethyl ester |
| P045 | 39196-18-4 | Thiofanox |
| P049 | 541-53-7 | Thioimidodicarbonic diamide |
| P014 | 108-98-5 | Thiophenol |
| P116 | 79-19-6 | Thiosemicarbazide |
| P026 | 5344-82-1 | Thiourea, (2-chlorophenyl)- |
| P072 | 86-88-4 | Thiourea, 1-naphthalenyl- |
| P093 | 103-85-5 | Thiourea, phenyl- |
| P123 | 8001-35-2 | Toxaphene |
| P118 | 75-70-7 | Trichloromethanethiol |
| P119 | 7803-55-6 | Vanadic acid, ammonium salt |
| P120 | 1314-62-1 | Vanadium(V) oxide |
| P084 | 4549-40-0 | Vinylamine, N-methyl-N-nitroso- |
| P001 | 81-81-2 | Warfarin |
| P121 | 557-21-1 | Zinc cyanide |
| P122 | 1314-84-7 | Zinc phosphide (R,T) |

[1]CAS Number given for parent compound only.

Table A-1 (cont'd)

| Industry and EPA hazardous waste No. | Hazardous waste | Hazard code |
|---|---|---|
| F020 | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of Hexachlorophene from highly purified 2,4,5-trichlorophenol.). | (H) |
| F021 | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives. | (H) |
| F022 | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra- , penta-, or hexachlorobenzenes under alkaline conditions. | (H) |
| F023 | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of Hexachlorophene from highly purified 2,4,5-trichlorophenol.). | (H) |
| F026 | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions. | (H) |
| F027 | Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing Hexachlorophene sythesized from prepurified 2,4,5-trichlorophenol as the sole component.). | (H) |

Table A-2

LIST OF TOXIC WASTES
Source: 40 CFR 261.33(f)

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| U001 | 75-07-0 | Acetaldehyde (I) |
| U034 | 75-87-6 | Acetaldehyde, trichloro- |
| U187 | 62-44-2 | Acetamide, N-(4-ethoxyphenyl)- |
| U005 | 53-96-3 | Acetamide, N-9H-fluoren-2-yl- |
| U112 | 141-78-6 | Acetic acid, ethyl ester (I) |
| U144 | 301-04-2 | Acetic acid, lead salt |
| U214 | 563-68-8 | Acetic acid, thallium (1+) salt |
| U232 | 93-76-5 | Acetic acid, (2,4,5,-trichlorophenoxy)- |
| U002 | 67-64-1 | Acetone (I) |
| U003 | 75-05-8 | Acetonitrile (I,T) |
| U004 | 98-86-2 | Acetophenone |
| U005 | 53-96-3 | 2-Acetylaminofluorene |
| U006 | 75-36-5 | Acetyl chloride (C,R,T) |
| U007 | 79-06-1 | Acrylamide |
| U008 | 79-10-7 | Acrylic acid(I) |
| U009 | 107-13-1 | Acrylonitrile |
| U011 | 61-82-5 | Amitrole |
| U012 | 62-53-3 | Aniline (I,T) |
| U014 | 492-80-8 | Auramine |
| U015 | 115-02-6 | Azaserine |
| U010 | 50-07-7 | Azirino(2',3':3,4)pyrrolo(1,2-a]indole-4,7-dione,6-amino-8-[((aminocarbonyl)oxy) methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl- |
| U157 | 50-49-5 | Benz[j]aceanthrylene, 1,2-dihydro-3-methyl- |
| U016 | 225-51-4 | 3,4-Benzacridine |
| U017 | 98-87-3 | Benzal chloride |
| U192 | 23950-58-5 | Benzamide, 3,5-dichloro-N-(1,1-diethyl-2-propynyl)- |
| U018 | 56-55-3 | Benz[a]anthracene |
| U094 | 57-97-6 | Benz[a]anthracene, 7,12-dimethyl- |
| U012 | 62-53-3 | Benzenamine (I,T) |
| U014 | 492-80-8 | Benzenamine, 4,4'-carbonimidoylbis[N,N-dimethyl- |
| U049 | 3165-93-3 | Benzenamine, 4-chloro-2-methyl- |
| U093 | 60-11-7 | Benzenamine, N,N-dimethyl-4-(phenylazo)- |
| U328 | 95-53-4 | Benzenamine, 2-methyl- |
| U353 | 106-49-0 | Benzenamine, 4-methyl- |
| U158 | 101-14-4 | Benzenamine, 4,4'-methylenebis[2-chloro- |
| U222 | 636-21-5 | Benzenamine, 2-methyl-, hydrochloride |
| U181 | 99-55-8 | Benzenamine, 2-methyl-5-nitro- |
| U019 | 71-43-2 | Benzene |
| U038 | 510-15-6 | Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy, ethyl ester |
| U030 | 101-55-3 | Benzene, 1-bromo-4-phenoxy- |
| U035 | 305-03-3 | Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]- |
| U037 | 108-90-7 | Benzene, chloro- |
| U221 | 25376-45-8 | Benzenediamine, ar-methyl- |
| U028 | 117-81-7 | 1,2-Benzenedicarboxylic acid, [bis(2-ethylhexyl)] ester |
| U069 | 84-74-2 | 1,2-Benzenedicarboxylic acid, dibutyl ester |
| U088 | 84-66-2 | 1,2-Benzenedicarboxylic acid, diethyl ester |
| U102 | 131-11-3 | 1,2-Benzenedicarboxylic acid, dimethyl ester |
| U107 | 117-84-0 | 1,2-Benzenedicarboxylic acid, di-n-octyl ester |
| U070 | 95-50-1 | Benzene, 1,2-dichloro- |
| U071 | 541-73-1 | Benzene, 1,3-dichloro- |
| U072 | 106-46-7 | Benzene, 1,4-dichloro- |
| U060 | 72-54-8 | Benzene, 1,1'-(2,2-dichloro-ethylidene) bis[4-chloro- |
| U017 | 98-87-3 | Benzene, (dichloromethyl)- |
| U223 | 26471-62-5 | Benzene, 1,3-diisocyanatomethyl- (R,T) |
| U239 | 1330-20-7 | Benzene, dimethyl- (I,T) |
| U201 | 108-46-3 | 1,3-Benzenediol |
| U127 | 118-74-1 | Benzene, hexachloro- |
| U056 | 110-82-7 | Benzene, hexahydro- (I) |
| U220 | 108-88-3 | Benzene, methyl- |
| U105 | 121-14-2 | Benzene, 1-methyl-2,4-dinitro- |
| U106 | 606-20-2 | Benzene, 2-methyl-1,3-dinitro- |
| U055 | 98-82-8 | Benzene, (1-methylethyl)- (I) |
| U169 | 98-95-3 | Benzene, nitro- (I,T) |
| U183 | 608-93-5 | Benzene, pentachloro- |
| U185 | 82-68-8 | Benzene, pentachloronitro- |
| U020 | 98-09-9 | Benzenesulfonic acid chloride (C,R) |
| U020 | 98-09-9 | Benzenesulfonyl chloride (C,R) |
| U207 | 95-94-3 | Benzene, 1,2,4,5-tetrachloro- |
| U061 | 50-29-3 | Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-chloro- |
| U247 | 72-43-5 | Benzene, 1,1'-(2,2,2-trichloroethylidene)[4-methoxy- |
| U023 | 98-07-7 | Benzene, (trichloromethyl)- (C,R,T) |
| U234 | 99-35-4 | Benzene, 1,3,5-trinitro- (R,T) |
| U021 | 92-87-5 | Benzidine |
| U202 | [1]81-07-2 | 1,2-Benzisothiazol-3-(2H)-one,1,1-dioxide and salts |
| U203 | 94-59-7 | 1,3-Benzodioxole, 5-(2-propenyl)- |
| U141 | 120-58-1 | 1,3-Benzodioxole, 5-(1-propenyl)- |
| U090 | 94-58-6 | 1,3-Benzodioxole, 5-propyl- |
| U064 | 189-55-9 | Benzo[rst] pentaphene |
| U022 | 50-32-8 | Benzo[a]pyrene |
| U197 | 106-51-4 | p-Benzoquinone |
| U023 | 98-07-7 | Benzotrichloride (C,R,T) |
| U085 | 1464-53-5 | 2,2'-Bioxirane (I,T) |
| U021 | 92-87-5 | [1,1'-Biphenyl]-4,4'-diamine |
| U073 | 91-94-1 | [1,1'-Biphenyl]-4,4'-diamine, 3,3'-dichloro- |
| U091 | 119-90-4 | [1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethoxy- |
| U095 | 119-93-7 | [1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl- |
| U027 | 39638-32-9 | Bis(2-chloroisopropyl) ether |
| U024 | 111-91-1 | Bis(2-chloromethoxy) ethane |
| U028 | 117-81-7 | Bis(2-ethylhexyl) phthalate |
| U225 | 75-25-2 | Bromoform |
| U030 | 101-55-3 | 4-Bromophenyl phenyl ether |
| U128 | 87-68-3 | 1,3-Butadiene, 1,1,2,3,4,4-hexachloro- |
| U172 | 924-16-3 | 1-Butanamine, N-butyl-N-nitroso- |
| U031 | 71-36-3 | 1-Butanol (I) |
| U159 | 78-93-3 | 2-Butanone (I,T) |
| U160 | 1338-23-4 | 2-Butanone peroxide (R,T) |
| U053 | 4170-30-3 | 2-Butenal |
| U074 | 764-41-0 | 2-Butene, 1,4-dichloro- (I,T) |

Table A-2 (cont'd)

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| U143 | 303-34-4 | 2-Butenoic acid, 2-methyl-, 7-[(2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy)methyl]-2,3,5,7a-tetrahydro-1-pyrrolizin-1-yl ester, [1S-[1alpha(Z),7(2S, 3R),7aalpha]]- |
| U031 | 71-36-3 | n-Butyl alchohol (I) |
| U136 | 75-60-5 | Cacodylic acid |
| U032 | 13765-19-0 | Calcium chromate |
| U238 | 51-79-6 | Carbamic acid, ethyl ester |
| U178 | 615-53-2 | Carbamic acid, methylnitroso-, ethyl ester |
| U097 | 79-44-7 | Carbamic chloride, dimethyl- |
| U114 | [1]111-54-6 | Carbamodithioic acid, 1,2-ethanediylbis-, salts and esters |
| U062 | 2303-16-4 | Carbamothioic acid, bis(1-methylethyl)-S-(2,3-dichloro-2-propenyl) ester |
| U215 | 6533-73-9 | Carbonic acid, dithallium(1+) salt |
| U033 | 353-50-4 | Carbonic difluoride |
| U156 | 79-22-1 | Carbonochloridic acid, methyl ester (I,T) |
| U033 | 353-50-4 | Carbon oxyfluoride (R,T) |
| U211 | 56-23-5 | Carbon tetrachloride |
| U034 | 75-87-6 | Chloral |
| U035 | 305-03-3 | Chlorambucil |
| U036 | 12789-03-6 | Chlordane |
| U026 | 494-03-1 | Chlornaphazine |
| U037 | 108-90-7 | Chlorobenzene |
| U039 | 59-50-7 | p-Chloro-m-cresol |
| U041 | 106-89-8 | 1-Chloro-2,3-epoxypropane |
| U042 | 110-75-8 | 2-Chloroethyl vinyl ether |
| U044 | 67-66-3 | Chloroform |
| U046 | 107-30-2 | Chloromethyl methyl ether |
| U047 | 91-58-7 | beta-Chloronaphthalene |
| U048 | 95-57-8 | o-Chlorophenol |
| U049 | 3165-93-3 | 4-Chloro-o-toluidine, hydrochloride |
| U032 | 13765-19-0 | Chromic acid, calcium salt |
| U050 | 218-01-9 | Chrysene |
| U051 | 8021-39-4 | Creosote |
| U052 | 1319-77-3 | Cresols (Cresylic acid) |
| U053 | 4170-30-3 | Crotonaldehyde |
| U055 | 98-82-8 | Cumene (I) |
| U246 | 506-68-3 | Cyanogen bromide |
| U197 | 106-51-4 | 2,5-Cyclohexadiene-1,4-dione |
| U056 | 110-82-7 | Cyclohexane (I) |
| U057 | 108-94-1 | Cyclohexanone (I) |
| U130 | 77-47-4 | 1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro- |
| U058 | 50-18-0 | Cyclophosphamide |
| U240 | [1]94-75-7 | 2,4-D, salts and esters |
| U059 | 20830-81-3 | Daunomycin |
| U060 | 72-54-8 | DDD |
| U061 | 50-29-3 | DDT |
| U062 | 2303-16-4 | Diallate |
| U063 | 53-70-3 | Dibenz[a,h]anthracene |
| U064 | 189-55-9 | Dibenzo[a,i]pyrene |
| U066 | 96-12-8 | 1,2-Dibromo-3-chloropropane |
| U069 | 84-74-2 | Dibutyl phthalate |
| U070 | 95-50-1 | o-Dichlorobenzene |
| U071 | 541-73-1 | m-Dichlorobenzene |
| U072 | 106-46-7 | p-Dichlorobenzene |
| U073 | 91-94-1 | 3,3'-Dichlorobenzidine |
| U074 | 764-41-0 | 1,4-Dichloro-2-butene (I,T) |

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| U075 | 75-71-8 | Dichlorodifluoromethane |
| U078 | 75-35-4 | 1,1-Dichloroethylene |
| U079 | 156-60-5 | 1,2-Dichloroethylene |
| U025 | 111-44-1 | Dichloroethyl ether |
| U081 | 120-83-2 | 2,4-Dichlorophenol |
| U082 | 87-65-0 | 2,6-Dichlorophenol |
| U240 | [1]94-75-7 | 2,4-Dichlorophenoxyacetic acid, salts and esters |
| U083 | 78-87-5 | 1,2-Dichloropropane |
| U084 | 542-75-6 | 1,3-Dichloropropene |
| U085 | 1464-53-5 | 1,2:3,4-Diepoxybutane (I,T) |
| U108 | 123-91-1 | 1,4-Diethyleneoxide |
| U086 | 1615-80-1 | N,N-Diethylhydrazine |
| U087 | 3288-58-2 | O,O-Diethyl-S-methyl-dithiophosphate |
| U088 | 84-66-2 | Diethyl phthalate |
| U089 | 56-53-1 | Diethylstilbestrol |
| U090 | 94-58-6 | Dihydrosafrole |
| U091 | 119-90-4 | 3,3'-Dimethoxybenzidine |
| U092 | 124-40-3 | Dimethylamine (I) |
| U093 | 60-11-7 | Dimethylaminoazobenzene |
| U094 | 57-97-6 | 7,12-Dimethylbenz[a]anthracene |
| U095 | 119-93-7 | 3,3'-Dimethylbenzidine |
| U096 | 80-15-9 | alpha,alpha-Dimethylbenzylhydroperoxide (R) |
| U097 | 79-44-7 | Dimethylcarbamoyl chloride |
| U098 | 57-14-7 | 1,1-Dimethylhydrazine |
| U099 | 540-73-8 | 1,2-Dimethylhydrazine |
| U101 | 105-67-9 | 2,4-Dimethylphenol |
| U102 | 131-11-3 | Dimethyl phthalate |
| U103 | 77-78-1 | Dimethyl sulfate |
| U105 | 121-14-2 | 2,4-Dinitrotoluene |
| U106 | 606-20-2 | 2,6-Dinitrotoluene |
| U107 | 117-84-0 | Di-n-octyl phthalate |
| U108 | 123-91-1 | 1,4-Dioxane |
| U109 | 122-66-7 | 1,2-Diphenylhydrazine |
| U110 | 142-84-7 | Dipropylamine (I) |
| U111 | 621-64-7 | Di-n-propylnitrosamine |
| U001 | 75-07-0 | Ethanal (I) |
| U174 | 55-18-5 | Ethanamine, N-ethyl-N-nitroso- |
| U155 | 91-80-5 | 1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)- |
| U067 | 106-93-4 | Ethane, 1,2-dibromo- |
| U076 | 75-34-3 | Ethane, 1,1-dichloro- |
| U077 | 107-06-2 | Ethane, 1,2-dichloro- |
| U131 | 67-72-1 | Ethane, hexachloro- |
| U024 | 111-91-1 | Ethane, 1,1'-[methylenebis(oxy)]bis[2-chloro- |
| U117 | 60-29-7 | Ethane, 1,1-oxybis- (I) |
| U025 | 111-44-4 | Ethane, 1,1'-oxybis[2-chloro- |
| U184 | 76-01-7 | Ethane, pentachloro- |
| U208 | 630-20-6 | Ethane, 1,1,1,2-tetrachloro- |
| U209 | 79-34-5 | Ethane, 1,1,2,2-tetrachloro- |
| U218 | 62-55-5 | Ethanethioamide |
| U227 | 110-80-5 | Ethanol, 2-ethoxy |
| U359 | 79-00-5 | Ethane, 1,1,2-trichloro- |
| U173 | 1116-54-7 | Ethanol, 2,2'-(nitrosoimino)bis- |
| U004 | 98-86-2 | Ethanone, 1-phenyl- |
| U043 | 75-01-4 | Ethene, chloro- |
| U042 | 110-75-8 | Ethene, (2-chloroethoxy)- |

Table A-2 (cont'd)

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| U166 | 130-15-4 | 1,4-Naphthoquinone |
| U167 | 134-32-7 | alpha-Naphthylamine |
| U168 | 91-59-8 | beta-Naphthylamine |
| U026 | 494-03-1 | 2-Naphthylamine, N,N'-bis(2-chloroethyl)- |
| U167 | 134-32-7 | 1-Naphthylenamine |
| U168 | 91-59-8 | 2-Naphthylenamine |
| U217 | 10102-45-1 | Nitric acid, thallium(1+) salt |
| U169 | 98-95-3 | Nitrobenzene (I,T) |
| U170 | 100-02-7 | p-Nitrophenol |
| U171 | 79-46-9 | 2-Nitropropane (I,T) |
| U172 | 924-16-3 | N-Nitrosodi-n-butylamine |
| U173 | 1116-54-7 | N-Nitrosodiethanolamine |
| U174 | 55-18-5 | N-Nitrosodiethylamine |
| U176 | 759-73-9 | N-Nitroso-N-ethylurea |
| U177 | 684-93-5 | N-Nitroso-N-methylurea |
| U178 | 615-53-2 | N-Nitroso-N-methylurethane |
| U179 | 100-75-4 | N-Nitrosopiperidine |
| U180 | 930-55-2 | N-Nitrosopyrrolidine |
| U181 | 99-55-8 | 5-Nitro-o-toluidine |
| U193 | 1120-71-4 | 1,2-Oxathiolane, 2,2-dioxide |
| U058 | 50-18-0 | 2H-1,3,2-Oxazaphosphorin-2-amine, N,N-bis(2-chloroethyl)tetrahydro-, 2-oxide |
| U115 | 75-21-8 | Oxirane (I,T) |
| U126 | 765-34-4 | Oxiranecarboxyaldehyde |
| U041 | 106-89-8 | Oxirane, (chloromethyl)- |
| U182 | 123-63-7 | Paraldehyde |
| U183 | 608-93-5 | Pentachlorobenzene |
| U184 | 76-01-7 | Pentachloroethane |
| U185 | 82-68-8 | Pentachloronitrobenzene (PCNB) |
| U242 | 87-86-5 | Pentachlorophenol |
| U186 | 504-60-9 | 1,3-Pentadiene (I) |
| U187 | 62-44-2 | Phenacetin |
| U188 | 108-95-2 | Phenol |
| U048 | 95-57-8 | Phenol, 2-chloro- |
| U039 | 59-50-7 | Phenol, 4-chloro-3-methyl- |
| U081 | 120-83-2 | Phenol, 2,4-dichloro- |
| U082 | 87-65-0 | Phenol, 2,6-dichloro- |
| U089 | 56-53-1 | Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-,(E)- |
| U101 | 105-67-9 | Phenol, 2,4-dimethyl- |
| U052 | 1319-77-3 | Phenol, methyl- |
| U132 | 70-30-4 | Phenol, 2,2'-methylenebis[3,4,6-trichloro- |
| U170 | 100-02-7 | Phenol, 4-nitro- |
| * U242 | 87-86-5 | Phenol, pentachloro- |
| * U212 | 58-90-2 | Phenol, 2,3,4,6-tetrachloro- |
| * U230 | 95-94-4 | Phenol, 2,4,5-trichloro- |
| U231 | 88-06-2 | Phenol, 2,4,6-trichloro- |
| U150 | 148-82-3 | L-Phenylalanine, 4-[bis(2-chloroethyl) amino]- |
| U145 | 7446-27-7 | Phosphoric acid, lead salt |
| U087 | 3288-58-2 | Phosphorodithioic acid, O,O-diethyl-, S-methyl ester |
| U189 | 108-95-2 | Phosphorus sulfide (R) |
| U190 | 85-44-9 | Phthalic anhydride |
| U191 | 109-06-8 | 2-Picoline |
| U179 | 100-75-4 | Piperidine, 1-nitroso- |
| U192 | 23950-58-5 | Pronamide |
| U194 | 107-10-8 | 1-Propanamine (I,T) |
| U111 | 621-64-7 | 1-Propanamine, N-nitroso-N-propyl- |
| U110 | 142-84-7 | 1-Propanamine, N-propyl- (I) |

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| U066 | 96-12-8 | Propane, 1,2-dibromo-3-chloro- |
| U149 | 109-77-3 | Propanedinitrile |
| U171 | 79-46-9 | Propane, 2-nitro- (I,T) |
| U027 | 39638-32-9 | Propane, 2,2'-oxybis[2-chloro- |
| U193 | 1120-71-4 | 1,3-Propane sultone |
| U235 | 126-72-7 | 1-Propanol, 2,3-dibromo-, phosphate (3:1) |
| U140 | 78-83-1 | 1-Propanol, 2-methyl- (I,T) |
| U002 | 67-64-1 | 2-Propanone (I) |
| U084 | 542-75-6 | 1-Propene, 1,3-dichloro- |
| U152 | 126-98-7 | 2-Propenenitrile, 2-methyl- (I,T) |
| U007 | 79-06-1 | 2-Propenamide |
| U243 | 1888-71-7 | 1-Propene, hexachloro- |
| U009 | 107-13-1 | 2-Propenenitrile |
| U008 | 79-10-7 | 2-Propenoic acid (I) |
| U113 | 140-88-5 | 2-Propenoic acid, ethyl ester (I) |
| U118 | 97-63-2 | 2-Propenoic acid, 2-methyl-, ethyl ester |
| U162 | 80-62-6 | 2-Propenoic acid, 2-methyl-, methyl ester (I,T) |
| *U233 | 93-72-1 | Propionic acid, 2-(2,4,5-trichlorophenoxy)- |
| U194 | 107-10-8 | n-Propylamine (I,T) |
| U083 | 78-87-5 | Propylene dichloride |
| U148 | 123-33-1 | 3,6-Pyridazinedione, 1,2-dihydro |
| U196 | 110-86-1 | Pyridine |
| U191 | 109-06-8 | Pyridine, 2-methyl- |
| U237 | 66-75-1 | 2,4(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]- |
| U164 | 56-04-2 | 4-(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo- |
| U180 | 930-55-2 | Pyrrolidine, 1-nitroso- |
| U200 | 50-55-5 | Reserpine |
| U201 | 108-46-3 | Resorcinol |
| U202 | 81-07-2 | Saccharin and salts |
| U203 | 94-59-7 | Safrole |
| U204 | 7783-00-8 | Selenious acid |
| U204 | 7783-00-8 | Selenium dioxide |
| U205 | 7446-34-6 | Selenium sulfide (R,T) |
| U015 | 115-02-6 | L-Serine, diazoacetate (ester) |
| * U233 | 93-72-1 | Silvex |
| U206 | 18883-66-4 | Streptozotocin |
| U103 | 77-78-1 | Sulfuric acid, dimethyl ester |
| U189 | 1314-80-3 | Sulfur phosphide (R) |
| * U232 | 93-76-5 | 2,4,5-T |
| U207 | 95-94-3 | 1,2,4,5-Tetrachlorobenzene |
| U208 | 630-20-6 | 1,1,1,2-Tetrachloroethane |
| U209 | 79-34-5 | 1,1,2,2-Tetrachloroethane |
| U210 | 127-18-4 | Tetrachloroethylene |
| * U212 | 58-90-2 | 2,3,4,6-Tetrachlorophenol |
| U213 | 109-99-9 | Tetrahydrofuran (I) |
| U214 | 15843-14-8 | Thallium(I) acetate |
| U215 | 6533-73-9 | Thallium(I) carbonate |
| U216 | 7791-12-0 | Thallium chloride |
| U217 | 10102-45-1 | Thallium(I) nitrate |
| U218 | 62-55-5 | Thioacetamide |
| U153 | 74-93-1 | Thiomethanol (I,T) |
| U244 | 137-26-8 | Thioperoxydicarbonic diamide, tetramethyl- |
| U219 | 62-56-6 | Thiourea |
| U244 | 137-26-8 | Thiuram |
| U220 | 108-88-3 | Toluene |
| U221 | 25376-45-8 | Toluenediamine |
| U223 | 26471-62-5 | Toluene diisocyanate (R,T) |

Table A-2 (cont'd)

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| U078 | 75-35-4 | Ethene, 1,1-dichloro- |
| U079 | 156-60-5 | Ethene, 1,2-dichloro-, (E)- |
| U210 | 127-18-4 | Ethene, tetrachloro- |
| U228 | 79-01-6 | Ethene, trichloro |
| U112 | 141-78-6 | Ethyl acetate (I) |
| U113 | 140-88-5 | Ethyl acrylate (I) |
| U238 | 51-79-6 | Ethyl carbamate |
| U038 | 510-15-6 | Ethyl 4,4'-dichlorobenzilate |
| U114 | 111-54-6 | Ethylenebis(dithiocarbamic acid), salts and esters |
| U067 | 106-93-4 | Etylene dibromide |
| U077 | 107-06-2 | Ethylene dichloride |
| U359 | 110-80-5 | Ethylene glycol monoethyl ether |
| U115 | 75-21-8 | Ethylene oxide (I,T) |
| U116 | 96-45-7 | Ethylene thiourea |
| U117 | 60-29-7 | Ethyl ether (I) |
| U076 | 75-34-3 | Ethylidene dichloride |
| U118 | 97-63-2 | Ethyl methacrylate |
| U119 | 62-50-0 | Ethylmethanesulfonate |
| U120 | 206-44-0 | Fluoranthene |
| U122 | 50-00-0 | Formaldehyde |
| U123 | 64-18-6 | Formic acid (C,T) |
| U124 | 110-00-9 | Furan (I) |
| U125 | 98-01-1 | 2-Furancarboxaldehyde (I) |
| U147 | 108-31-6 | 2,5-Furandione |
| U213 | 109-99-9 | Furan, tetrahydro- (I) |
| U125 | 98-01-1 | Furfural (I) |
| U124 | 110-00-9 | Furfuran (I) |
| U206 | 18883-66-4 | D-Glucopyranose, 2-deoxy-2(3-methyl-3-nitrosoureido)- |
| U126 | 765-34-4 | Glycidylaldehyde |
| U163 | 70-25-7 | Guanidine, N-methyl-N'-nitro-N-nitroso- |
| U127 | 18-74-1 | Hexachlorobenzene |
| U128 | 87-68-3 | Hexachlorobutadiene |
| U129 | 58-88-9 | Hexachlorocyclohexane (gamma isomer) |
| U130 | 77-47-4 | Hexachlorocyclopentadiene |
| U131 | 67-72-1 | Hexachloroethane |
| U132 | 70-30-4 | Hexachlorophene |
| U243 | 1888-71-7 | Hexachloropropene |
| U133 | 302-01-2 | Hydrazine (R,T) |
| U086 | 1615-80-1 | Hydrazine, 1,2-diethyl- |
| U098 | 57-14-7 | Hydrazine, 1,1-dimethyl- |
| U099 | 540-73-8 | Hydrazine, 1,2-dimethyl- |
| U109 | 122-66-7 | Hydrazine, 1,2-diphenyl- |
| U134 | 7664-39-3 | Hydrofluoric acid (C,T) |
| U134 | 7664-39-3 | Hydrogen fluoride (C,T) |
| U135 | 7783-06-4 | Hydrogen sulfide |
| U096 | 80-15-9 | Hydroperoxide, 1-methyl-1-phenylethyl- (R) |
| U136 | 75-60-5 | Hydroxydimethylarsine oxide |
| U116 | 96-45-7 | 2-Imidazolidinethione |
| U137 | 193-39-5 | Indeno[1,2,3-cd]pyrene |
| U139 | 9004-66-4 | Iron dextran |
| U190 | 85-44-9 | 1,3-Isobenzofurandione |
| U140 | 78-83-1 | Isobutyl alcohol (I,T) |
| U141 | 120-58-1 | Isosafrole |
| U142 | 143-50-0 | Kepone |
| U143 | 303-34-4 | Lasiocarpine |
| U144 | 301-04-2 | Lead acetate |
| U146 | 1335-32-6 | Lead, bis(acetato-O)tetrahydroxytri- |
| U145 | 7446-27-7 | Lead phosphate |
| U146 | 1335-32-6 | Lead subacetate |
| U129 | 58-89-9 | Lindane |
| U147 | 108-31-6 | Maleic anhydride |
| U148 | 123-33-1 | Maleic hydrazide |
| U149 | 109-77-3 | Malononitrile |
| U150 | 148-82-3 | Melphalan |
| U151 | 7439-97-6 | Mercury |
| U152 | 126-98-7 | Methacrylonitrile (I,T) |
| U092 | 124-40-3 | Methanamine, N-methyl- (I) |
| U029 | 74-83-9 | Methane, bromo- |
| U045 | 74-87-3 | Methane, chloro-(I,T) |
| U046 | 107-30-2 | Methane, chloromethoxy- |
| U068 | 74-95-3 | Methane, dibromo- |
| U080 | 75-09-2 | Methane, dichloro- |
| U075 | 75-71-8 | Methane, dichlorodifluoro- |
| U138 | 74-88-4 | Methane, iodo- |
| U119 | 62-50-0 | Methanesulfonic acid, ethyl ester |
| U211 | 56-23-5 | Methane, tetrachloro- |
| U153 | 74-93-1 | Methanethiol (I,T) |
| U225 | 75-25-2 | Methane, tribromo- |
| U044 | 67-66-3 | Methane, trichloro- |
| U121 | 75-69-4 | Methane, trichlorofluoro- |
| U123 | 64-18-6 | Methanoic acid (C,T) |
| U154 | 67-56-1 | Methanol (I) |
| U155 | 91-80-5 | Methapyrilene |
| U142 | 143-50-0 | 1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one,1,1a,3,3a,4,5,5,5a,5b,6-decachloro-octahydro- |
| U247 | 72-43-5 | Methoxychlor |
| U154 | 67-56-1 | Methyl alcohol (I) |
| U029 | 74-83-9 | Methyl bromide |
| U186 | 504-60-9 | 1-Methylbutadiene (I) |
| U045 | 74-87-3 | Methyl chloride (I,T) |
| U156 | 79-22-1 | Methylchlorocarbonate (I,T) |
| U226 | 71-55-6 | Methylchloroform |
| U157 | 56-49-5 | 3-Methylcholanthrene |
| U158 | 101-14-4 | 4,4'-Methylenebis(2-chloroaniline) |
| U068 | 74-95-3 | Methylene bromide |
| U080 | 75-09-2 | Methylene chloride |
| U159 | 78-93-3 | Methyl ethyl ketone (MEK)(I,T) |
| U160 | 1338-23-4 | Methyl ethyl ketone peroxide (R,T) |
| U138 | 74-88-4 | Methyl iodide |
| U161 | 108-10-1 | Methyl isobutyl ketone (I) |
| U162 | 80-62-6 | Methyl methacrylate (I,T) |
| U163 | 70-25-7 | N-Methyl-N'-nitro-N-nitrosoguanidine |
| U161 | 108-10-1 | 4-Methyl-2-pentanone (I) |
| U164 | 56-04-2 | Methylthiouracil |
| U010 | 50-07-7 | Mitomycin C |
| U059 | 20830-81-3 | 5,12-Naphthacenedione, (8S-cis)-8-acetyl-10-[(3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy- |
| U165 | 91-20-3 | Naphthalene |
| U047 | 91-58-7 | Naphthalene, 2-chloro- |
| U166 | 130-15-4 | 1,4-Naphthalenedione |
| U236 | 72-57-1 | 2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-dimethyl-(1,1'-biphenyl)-4,4'diyl)]-bis (azo) bis(5-amino-4-hydroxy)-, tetrasodium salt |

Table A-2 (cont'd)

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| U328 | 95-53-4 | o-Toluidine |
| U353 | 106-49-0 | p-Toluidine |
| U222 | 636-21-5 | o-Toluidine hydrochloride |
| U011 | 61-82-5 | 1H-1,2,4-Triazol-3-amine |
| U226 | 71-55-6 | 1,1,1-Trichloroethane |
| U227 | 79-00-5 | 1,1,2-Trichloroethane |
| U228 | 79-01-6 | Trichloroethylene |
| U121 | 75-69-4 | Trichloromonofluoromethane |
| * U230 | 95-95-4 | 2,4,5-Trichlorophenol |
| * U231 | 88-06-2 | 2,4,6-Trichlorophenol |
| U234 | 99-35-4 | sym-Trinitrobenzene (R,T) |
| U182 | 123-63-7 | 1,3,5-Trioxane, 2,4,6-trimethyl- |
| U235 | 126-72-7 | Tris(2,3-dibromopropyl) phosphate |
| U236 | 72-57-1 | Trypan blue |
| U237 | 66-75-1 | Uracil mustard |
| U176 | 759-73-9 | Urea, N-ethyl-N-nitroso- |
| U177 | 684-93-5 | Urea, N-methyl-N-nitroso- |
| U043 | 75-01-4 | Vinyl chloride |
| U248 | 81-81-2 | Warfarin, when present at concentrations of 0.3% or less |
| U239 | 1330-20-7 | Xylene (I) |
| U200 | 50-55-5 | Yohimban-16-carboxylic acid, 11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl) oxy]-, methyl ester |
| U249 | 1314-84-7 | Zinc phosphide, when present at concentrations of 10% or less. |

[1]CAS Number given for parent compound only.

* These wastes are also designated as F027 wastes. See Table A-1.

Table A-2 (cont'd)

| Industry and EPA hazardous waste No. | Hazardous waste | Hazard code |
|---|---|---|
| Generic: | | |
| F001 | The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | (T) |
| F002 | The following spent halogenated solvents: Tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | (T) |
| F003 | The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | (I)* |
| F004 | The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | (T) |
| F005 | The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | (I,T) |
| F006 | Wastewater treatment sludges from electroplating operations except from the following processes: (1) Sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum. | (T) |
| F019 | Wastewater treatment sludges from the chemical conversion coating of aluminum. | (T) |
| F007 | Spent cyanide plating bath solutions from electroplating operations. | (R, T) |
| F008 | Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process. | (R, T) |
| F009 | Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process. | (R, T) |
| F010 | Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process. | (R, T) |
| F011 | Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations. | (R, T) |
| F012 | Quenching waste water treatment sludges from metal heat treating operations where cyanides are used in the process. | (T) |
| F024 | Wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes from the production of chlorinated aliphatic hydrocarbons, having carbon content from one to five, utilizing free radical catalyzed processes. [This listing does not include light ends, spent filters and filter aids, spent dessicants, wastewater, wastewater treatment sludges, spent catalysts, and wastes listed in Section 261.32.]. | (T) |
| F028 | Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027. | (T) |

APPENDIX B

IDENTIFYING RCRA CHARACTERISTIC HAZARDOUS WASTES

EPA has identified four characteristics which cause a waste to be regulated as a hazardous waste: ignitable, corrosive, reactive, and extraction procedure (EP) toxic. For each characteristic, EPA has developed approved methods for determining whether a waste is hazardous. A brief description of each characteristic and applicable tests follows. The specific definitions of these characteristics are specified in 40 CFR 261, Subpart C.

CHARACTERISTIC OF IGNITABILITY:

A waste exhibits the characteristic of ignitability if a representative sample of the waste is easily combustible or flammable. Examples of these ignitable wastes include paint wastes, certain degreasers, and solvents. The specific characteristics of an ignitable waste include the following properties:

- A liquid that has a flash point of less than 140°F as determined by a specific test method. This does not include aqueous solutions containing less than 24% alcohol by volume.
- It is not a liquid but is capable of causing fire through friction, absorption of moisture, or spontaneous chemical changes under standard temperature and pressure conditions.
- It is an ignitable compressed gas.
- It is an oxidizer.

A waste exhibiting any of these characteristics of ignitablility is identified for regulatory purposes with an EPA hazardous waste number of D001.

CHARACTERISTIC OF CORROSIVITY

A waste exhibiting the characteristic of corrosivity will dissolve metal or burn the skin. Examples of corrosive wastes include waste rust removers, waste acids and alkaline solutions, and waste battery acids. The specific characteristics of a corrosive waste include the following:

- An aqueous waste with a pH less than or equal to 2.0 or greater than or equal to 12.5 as determined by an EPA-approved method.

- A liquid which corrodes steel at a rate greater than 6.35 millimeters (0.250 inches) per year at a temperature of 130°F as determined by specific test methods.

A waste exhibiting any of these characteristics of corrosivity is identified for regulatory purposes with an EPA hazardous waste number of D002.

CHARACTERISTIC OF REACTIVITY

A waste exhibiting the characteristic of reactivity is one that is unstable or undergoes rapid or violent chemical reactions with water or other material. Examples of reactive wastes include cyanide plating wastes, waste bleaches, and other waste oxidizers. The specific characteristics of a reactive waste include the following:

- It is normally unstable and readily undergoes violent changes without detonating.
- It reacts violently with water.
- It forms a potentially explosive mixture with water.
- It generates toxic gases, vapors, or fumes when mixed with water.
- It is a cyanide or sulfide bearing waste which can generate toxic gases, vapors, or fumes when exposed to pH conditions between 2.0 and 12.5.
- It is capable of detonation or a explosive reaction under standard temperature and pressure conditions or if subjected to a strong initiating source or if heated.

A waste exhibiting any of these reactive characteristics is identified for regulatory purposes with an EPA hazardous waste number of D003.

CHARACTERISTIC OF EP TOXICITY

EPA has designed a leaching test, called the Extraction Procedure (EP), to measure the amount of toxic materials that can be extracted from the waste under specific conditions. If the extract obtained from the test exceeds set concentration limits for certain constituents, the waste will be considered hazardous. The EP toxicity test is used to determine whether

leachate from disposal of a particular hazardous waste will pollute ground water.

There are 14 constituents that EPA has established concentration limits for in the EP toxicity test, including eight metals and six pesticides. Each of these contaminants has been assigned a specific EPA hazardous waste number. These contaminants, their associated EPA hazardous waste number, and the established concentration limits are listed in Table B-1. If a representative sample of a waste if found to contain any of the contaminants listed in this table at a concentration greater than or equal to those limits specified, the waste is considered an EP toxic hazardous waste.

## APPENDIX C: REFERENCES AND CONTACTS

### FEDERAL REGULATIONS

Code of Federal Regulations: The RCRA regulations addressed in this manual are referenced in the Code of Federal Regulations, Title 40, Parts 260 to 272.

Copies of the Code of Federal Regulations are available in most large public libraries. They may also be purchased from the Government Printing Office by calling (202) 783-3238.

RCRA Hotline: As a public service, the U.S. Environmental Protection Agency has provided a RCRA Hotline where anyone can call for technical or administrative information regarding the RCRA regulations.

The phone number for the RCRA Hotline is: 1-800-424-9346 (Hours from 8:30 a.m. to 4:30 p.m. EST, Monday through Friday)

References:

(1) "Understanding the Small Quantity Generator Rules: A Handbook for Small Business", published by EPA, Office of Solid Waste and Emergency Response, September, 1986. (EPA Publication No. EPA/530-SW-86-019) This is a handy, easy-to-read, reference for understanding the small quantity generator regulations.

(2) Handbook of Hazardous Waste Management for Small Quantity Generators, by Russell.W. Phifer and William .R McTigue, Jr., Lewis Publishers, Inc., 1988. This book provides a guide to the small quantity generator requirements, waste types generated from various industries, liability considerations, and onsite and offsite management of hazardous wastes.

### STATE REGULATIONS

Administrative Rules of Montana: The state regulations addressed in this manual can be found in the Administrative Rules of Montana, Rule 16, Chapter 44.

Montana Department of Health and Environmental Science (DHES): The DHES can provide assistance to anyone with questions or concerns about the federal and state regulations, compliance issues, or waste management practices.

For further information, contact the DHES, Solid and Hazardous Waste Bureau, Room B201, Cogswell Building, Helena, Montana, 59620. The phone number is: (406) 444-2821.

WASTE MANAGEMENT

References:

(1) International Fabricare Institute, Technical Bulletin T-568, Reduction of Solvent Content in Cartridges, Silver Springs, MD, January 1985.

(2) G.R. Jordan, Massachusetts Department of Enviornmental Management, Bureau of Solid Waste Disposal, Solvent Recovery in the Dry Cleaning Industry, March, 1985.

Contacts:

Waste Exchange Program - This program, sponsored by the Montana Chamber of Commerce, is an informational exchange program designed bring together generators and users of a waste which have a reuse or recycling value. The program is intended to put generators in contact with waste users that can reuse the waste as a feedstock or substitute material in their operations. The Chamber of Commerce publishes a free newletter which lists both waste generators with potentially reusable waste materials, and users who are in the market for a particular reusable waste material.

The state chamber can be contacted at 110 Neill Avenue, Helena, Montana, 59601. The telephone number is (406) 442-2405.